

Tri-Service SCAPS X-Ray Fluorescence Metals Sensor

Detection, Identification, and Delineation of Heavy Metals



The Tri-Service SCAPS energy dispersive X-Ray Fluorescence (XRF) Sensor offers fast, inexpensive, detailed characterization of metals contaminated sites.

Traditional methods of site characterization are costly and time consuming. Using the X-Ray Fluorescence (XRF) Metals Sensor, deployed by the Tri-Service Site Characterization and Analysis Penetrometer System (SCAPS), will result in reduced cost and time to characterize and remediate sites contaminated with heavy metals. SCAPS and its associated sensors provide the DoD, DOE, EPA, and the private sector with a cost-effective means to rapidly characterize subsurface conditions at contaminated sites through real time, on-site data acquisition and processing.



USAEC

Environmental Technology Division



Solutions

Delineating Subsurface Heavy Metals Contamination

The SCAPS XRF Metals Sensor adds heavy metals detection capability to SCAPS in both the saturated and unsaturated zones. The XRF can detect heavy metals at levels below 100 ppm, up to the full depth allowable by the cone penetrometer. Upon completion of the push, grouting is required to seal the penetrometer hole in order to ensure there is no seepage or cross-layer contamination.

XRF technology is a well-established, non-destructive, laboratory and hand-held field screening method for determining elemental concentrations at ppm levels in complex samples.

The SCAPS XRF Metals Sensor operates by detecting the characteristic x-rays emitted by metal atoms in the soil. The sensor is advanced to a selected sampling depth at which point an x-ray source in the probe tip bombards the surrounding soil with incident x-rays. Metal atoms present in the soil are excited and emit fluorescent x-rays with an energy that is characteristic of specific elements. These emitted x-rays are detected at the probe tip and provide an individual peak, or "signature," for each type of metal present in the soil. These "signatures" are identified and quantified in real time onboard the SCAPS truck.

Unlike optical spectroscopies, XRF excites atomic states which are mostly independent of the chemical state of atoms and requires no sample preparation. The relatively high energy of the x-rays makes them penetrate any type of matter for distances of several microns to several millimeters, regardless of optical transparency. Any type of atom with sufficiently energetic core levels can be detected in any matrix.

Application of innovative SCAPS field screening technologies, such as the XRF Metals Sensor, results in faster, more detailed site characterization at significantly reduced costs compared to traditional methods.

For more information on USAEC-ETD technology programs please call the:

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